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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/568,607

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Toshio Kiyokawa

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EXAMINER

PAK, HANNAH J

ART UNIT

PAPER NUMBER

4171

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/568,607	Applicant(s) KIYOKAWA ET AL.	
	Examiner Hannah Pak	Art Unit 4171	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>09/15/06, 02/15/06</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION***Claim Objections***

Claim 5 is objected to because of the following informalities: the average particle size of "5 x 10~6 to 500 x 10"6 m" recited in claim 5 appears to be a typographical error. Please correct it as "5 x 10⁻⁶ to 500 x 10⁻⁶" as shown on page 6 of the specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshio et al. (JP 2003-034523) in view of Miyata et al. (US 5,039,509).

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The claimed subject matter is drawn to a sphere-shaped magnesium oxide powder surface-coated with a double oxide and a process for making the same. This circularity of the sphere is defined by an average shape factor of 1.25 or less. According to pages 4 and 5 of the specification:

“The shape factor is a value determined with respect to a projected image of particles and represented by the formula, $(\text{Circumference length})^2/[4\pi \times (\text{Sum of areas})]$. The shape factor indicates that the value is 1 when the projected image of particles is precisely a circle, and that the value is larger when the projected image has an irregular form. The average shape factor employed in the present invention is an average value of the shape factors of 100 particles determined using a laser microscope and an image analysis software.”

With respect to claims 1, 10, and 13, Toshio et al. teach coated magnesia (henceforth a magnesium oxide powder) with thermal conductivity characteristics used as a material of the resin filler for a semiconductor closure (Paragraphs 3 and 10).

The mean diameter of the magnesium oxide particle is preferably 10×10^{-6} - 100×10^{-6} m having a BET specific surface area of 1.0×10^3 m²/kgm (compare paragraph 23 with claim 5).

As to claims 3 and 7, the magnesium oxide powder is covered (coated) with an enveloping layer containing multiple oxides of silicon and magnesium oxide (Paragraphs 12 and 13).

As to claims 6, 8, and 9, the coated magnesium oxide powder is formed by mixing about 1-35 mass % of the silicon compound (includes silicon oxide) and magnesium oxide powder (Paragraph 15). After filtration to obtain a solid from the mixture, the solid was heated at a high temperature of 1473-2073 K (Paragraph 17), which is also below the melting point of covering (coating) silicon

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oxide material, to obtain the coated magnesium powder. The crystallite diameter of the resulting magnesium oxide powder is 50×10^{-9} m or more (Paragraphs 20).

Toshio et al. do not specifically indicate that its coated magnesium oxide powder is in the form of a sphere having an average shape factor of 1.25 or less and the specific ranges of materials claimed.

However, Miyata et al. disclose it is desirable to use a magnesium oxide powder with silica (SiO_2) coating in a spherical form in a resin to improve its thermal conductivity and to obtain its excellent workability for forming ceramics (Col. 5, lines 5-55). The spherical shape taught by Miyata et al. embraces those which are essentially and perfectly spherical, i.e. an average shape factor of about 1 or less.

Therefore, it would have been obvious to one of ordinary skill to employ a coated magnesium oxide powder of Toshio et al. in the spherical form as taught by Miyata et al. in the resin to improve its thermal conductivity and to obtain its excellent workability for forming ceramics.

As to claims 2, 4, and 9, the temperature and mass percent of silicon oxide ranges taught by Toshio et al. overlap with the claimed ranges. Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the invention was made, since it has been held that choosing the overlapping portion, of the range taught by Toshio et al. and the range claimed by the applicant, has been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 USPQ 549.

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshio et al. (JP 2003-034523) in view of Miyata et al. (US 5,039,509) as applied to claims 1-10 and 13 above, and further in view of Anabuki et al. (JP 06-171928).

Toshio et al. and Miyata et al. do mention a resin composition containing a sphere-shaped coated magnesium oxide powder as discussed above, but do not specify the types of resin composition required by the claims.

However, Anabuki et al. disclose epoxy or silicone rubber resins comprising a magnesium oxide particle surface-coated with an organic silicate (silicon oxide) compound to impart sufficient thermal conductivity without reducing the original mechanical strength of resin and its electric nature (Paragraphs 1, 3, and 7). Thermal conductivity is higher in epoxy or silicone rubber resins as opposed to other types of resin (Paragraph 7).

Therefore, it would have been obvious to one of ordinary skill in the art to employ epoxy or silicone rubber resins of Anabuki et al. having sphere-shaped magnesium oxide powder disclosed by Toshio et al. and Miyata et al. to impart sufficient thermal conductivity without reducing the original mechanical strength of resin and its electric nature. Furthermore, it would have been obvious to use epoxy or silicone rubber resins as opposed to other types of resin because these resins have higher thermal conductivity.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hannah Pak whose telephone number is (571) 270-5456. The examiner can normally be reached on Monday - alternating Fridays (7:30 am - 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 4171

Hannah Pak
Examiner
Art Unit 4171

/HP/